Sequoyah Nuclear Plant

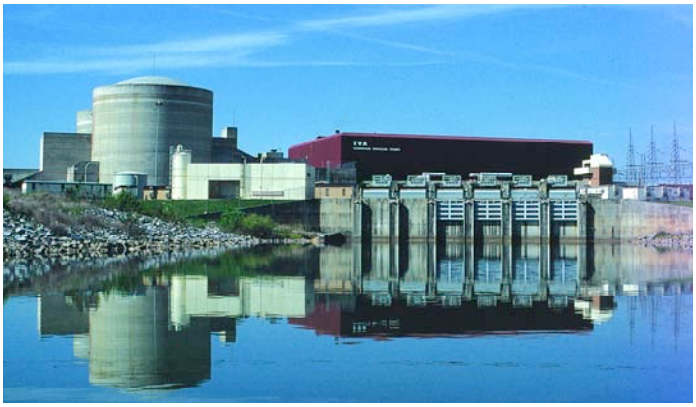
Owner and Operator: Tennessee Valley Authority

- TVA is a federal corporation that has evolved into America's largest public power provider, with annual operating revenue of $6.8 billion. Although TVA is owned by the federal government, all of its programs and business operations are self-financed.

TVA Overview

- TVA supplies electricity to large industries and 158 distributors that serve 8.3 million consumers in the seven-state service region, which covers most of Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia.

- TVA also offers economic development services and manages the Tennessee River and its tributaries to provide multiple benefits, including flood control, navigation, water quality, and recreation.



TVA Nuclear Overview

- TVA's three nuclear plants with five operating units—Browns Ferry, in Athens, Alabama; Sequoyah, in Soddy-Daisy, Tennessee; and Watts Bar, in Spring City, Tennessee—account for about 20 percent of the corporation's total generating capacity. As an integral part of the company's diverse generating sources, these plants provide enough power to serve more than three million homes in the Tennessee Valley.

- TVA Nuclear operates in a highly regulated environment and is overseen by the Nuclear Regulatory Commission, which has found in annual reviews that each of the nuclear plants operates in a manner that preserves public health and safety and fully meets objectives for safe operation.

Sequoyah Nuclear Plant

- The plant is named in honor of a Cherokee Indian who lived in the area and invented an alphabet that was the tribe's first written form of communication.

- It is located on 525 acres on the Chickamauga Reservoir in Soddy-Daisy, Tennessee, about 20 miles northeast of Chattanooga.

- The plant consists of two Westinghouse pressurized water reactors that can produce enough electricity to supply about 1.3 million homes a day.

Sequoyah Management: Randy Douet, Site Vice President
Dave Kulisek, Plant Manager

Workforce

- During normal operation, Sequoyah is staffed by approximately 900 TVA employees, primarily craftsmen, engineers, and operators.

- An additional 600 to 800 contract employees work at the site to assist during refueling and maintenance outages.

Economic Impact

- Sequoyah generates a secondary local economic impact of an additional 3,300 jobs with $88 million in payroll.

- As a result of Sequoyah employment and the resulting jobs in the area economy, local retail and service purchases total almost $105 million each year. Additionally, these workers pay about $6 million in sales taxes and $1.2 million in property taxes annually.

- The plant also spends over $50 million annually for materials and services to support plant operations.

Operating History

- TVA's second nuclear power plant.
- Groundbreaking occurred in 1969.
- Major construction began in 1970.
- Commercial operation for Unit 1 began on July 1, 1981.
- Commercial operation for Unit 2 began on June 1, 1982.
- Longest continuous operating run for Unit 1 is 478 days, 16 hours, and 5 minutes: November 23, 2001 – March 17, 2003.
- Longest continuous operating run for Unit 2 is 512 days and 16 hours: November 18, 2000 – April 14, 2002.

Performance Highlights, Fiscal Year 2003

- Sequoyah generated 16.47 billion kilowatt-hours (net).

- Sequoyah Unit 1 operated "breaker to breaker," that is, the unit operated continuously from the end of one planned refueling outage to the beginning of the next one. Unit 1 operated from November 23, 2001, until March 17, 2003—a total of 478 days, 16 hours, and five minutes.

- The August 6 issue of Nucleonics Week, an industry publication, reported that Sequoyah earned the title of most efficient generator in the country over a three-year period (2000 – 2002) by producing power at 11.48 mills per kilowatt-hour (1.14 cents per kilowatt-hour). The publication also reported that for the most recent single-year performance (2002), Sequoyah ranked as the second-most-efficient generator in the U.S., with operation-and-maintenance costs of 11.64 mills per kilowatt-hour (1.16 cents per kilowatt-hour).

Security

- Sequoyah and TVA's other nuclear power plants were some of the most secure industrial facilities in the U.S. before September 11, 2001, and their security has been enhanced since then.

- The plants are fortified by robust concrete-and-steel physical structures that protect the reactor and other plant facilities.

- Since September 2001, a comprehensive review of security requirements has been conducted at TVA's nuclear power plants, and TVA Nuclear continues to refine existing security measures and add new ones. For example, the security perimeters at TVA nuclear plants have been extended and security patrols and staffing have been increased. All of TVA's nuclear powerplants feature state-of-the-art detection equipment and sophisticated access control systems.

Emergency Preparedness

- TVA Nuclear's standards for operating its plants and its highly trained workforce make it unlikely that a radiological incident would occur. Nevertheless, emergency preparedness is an integral part of TVA's nuclear power program.

- TVA works closely with federal, state, and local agencies to ensure emergency response plans are in place to protect the public and employees.

- Each year, TVA and state and county agencies provide important emergency preparedness planning information to those within 10 miles of each nuclear power plant. The information includes instructions on what to do if the Prompt Notification System sirens in the area sound and if residents are advised to take shelter or leave an area. To view a copy of the emergency planning information, go to www.tva.com/power/nuclear.htm.

Radiation

- Radiation is a form of energy that can move through empty space, like light.

- When radiation passes through any kind of matter—solid, liquid, or gas—it transfers some of its energy into that matter. Ionizing radiation transfers enough energy to change the physical state of the atoms with which it interacts, causing them to become electrically charged.

- Everyone is exposed to small amounts of radiation each day. On average, about 80 percent of the radiation to which the public is exposed every year comes from natural sources, such as air and water. The rest comes from man-made sources, like medical and dental x-rays.

- Nuclear power plants represent one of the smallest sources of radiation to which the public is exposed.

- A nuclear plant's containment building and reactor vessel, as well as other barriers, are designed to contain radiation. Monitoring is conducted on a continuous basis to assess the impact of plant operations on the environment. The results of this monitoring demonstrate that the radiological impact is negligible when compared with natural background radiation levels.

- Safety standards are also enforced to protect nuclear power plant workers. TVA Nuclear has operating procedures to keep radiation doses as low as reasonably achievable.

- Nuclear Regulatory Commission data in 2001 showed that half of the monitored workers at the nation's 103 nuclear power reactors received no measurable dose; the average worker received about 160 millirems—about half of the average natural background radiation. (Source: Understanding Radiation, Its Effects and Benefits, Nuclear Energy Institute)

Waste Management

- After a nuclear plant operates for 18 to 24 months, the buildup of depleted fuel and fission fragments makes it no longer practical or efficient to continue using the fuel. This "spent fuel" is removed from the reactor and stored at the plant either in steel-lined concrete vaults filled with water or in aboveground steel-reinforced concrete containers. The spent fuel will be stored there until a permanent federal repository is completed.

- In either case, plant containment systems are designed to prevent the release of radioactivity while withstanding natural disasters such as tornadoes and floods.

- After the federal repository is complete, the spent fuel will be transported for permanent disposal.

How nuclear power plants work

- All power plants convert a source of energy into electricity. Some plants do that by heating water to create steam, which turns a turbine that drives the electric generator. Inside the generator, a large electromagnet spins within a coil of wire, producing electricity.

- A fossil plant burns coal or oil to make heat. A nuclear plant uses slightly enriched uranium dioxide for fuel. The uranium dioxide is made into pellets and sealed in long metal tubes called fuel rods. The rods are bundled together in fuel assemblies that are placed in the reactor.

How reactors produce heat to generate electricity

- As a nuclear plant starts up, uranium atoms in the fuel rods release particles called neutrons. When the neutrons strike the uranium atoms, the atoms split (or fission), producing heat and releasing more neutrons. Those neutrons strike other atoms, causing them to split. This process continues in a chain reaction, creating the heat needed to turn water into steam.

- The two main types of nuclear reactors are boiling water reactors and pressurized water reactors.

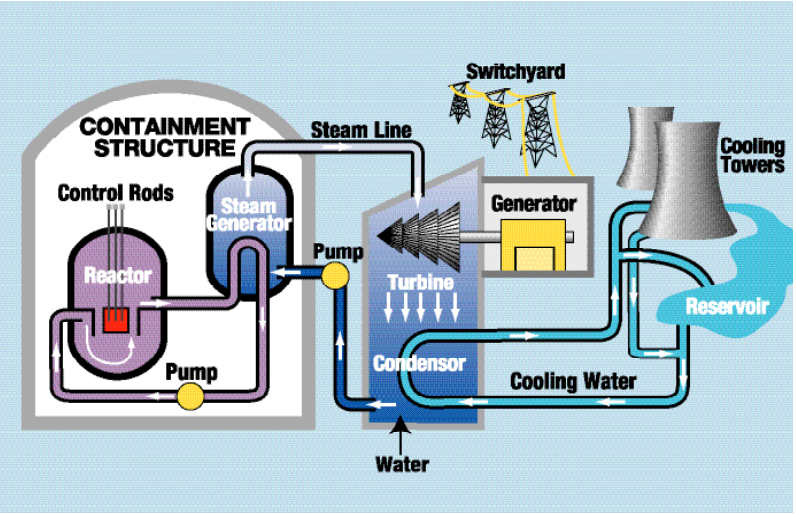
How a pressurized water reactor, like Sequoyah, operates

- Water (purple) is heated by the fuel rods but is kept under high pressure inside the reactor so that it doesn't boil.

- The hot water from the reactor passes through tubes inside a steam generator, where the heat is transferred to water flowing around the tubes.

- The water (blue) in this secondary loop boils and turns to steam (light blue).

- The steam turns the turbines that spin the generator to produce electricity.



- After its energy is used up in the turbines, the steam is drawn into a condenser, where it is cooled back into water and pumped back to the steam generator.

The availability of an ample supply of water for cooling is critical for the successful operation of nuclear and coal-fired plants. TVA manages the Tennessee River system to meet the cooling water needs of its generating plants while balancing the public benefits of navigation, flood control, power supply, water quality, and recreation.